

**Kanuti NWR Progress Report FY10**  
**Aerial Surveys of Molting Geese on Kanuti National Wildlife Refuge, June 2010**

**Purpose:** Aerial survey of molting Greater White-fronted and Canada geese  
**Location:** Kanuti National Wildlife Refuge, Koyukuk and Kanuti rivers, and Lake Todatonten  
**Dates:** June 27–29, 2010  
**Participants:** Mike Spindler, Wade Schock  
**Author:** Christopher M. Harwood  
**Report Date:** September 16, 2010

**Summary:**

During 27–29 June 2010, Refuge Manager/Pilot Mike Spindler and Volunteer Wade Schock conducted aerial surveys of molting Greater White-fronted Geese (*Anser albifrons*, hereafter “white-fronts”), and Canada Geese (*Branta canadensis*). As in 2009, they employed a reduced effort by surveying only 25 of the original 101 aerial line transects to target historical goose “hot spots” on or near Kanuti National Wildlife Refuge. These surveys covered three core areas, nearby Lake Todatonten, and the terminus of the Kanuti River. Totals of 361 white-fronts (272 adults and 89 young) and 289 Canada Geese (141 adults and 148 young) were observed during official surveys. As in the past, most white-fronts were found in the traditional “Mud Lakes” area on the Refuge. Additional geese were observed incidentally in non-transect surveys of the main stem Koyukuk River, Kanuti River, and Kanuti Chalatna Creek.

**Background:**

Except for 2004 and 2005 when smoke precluded surveying, Kanuti NWR (KANWR) has participated in the coordinated aerial molting white-front survey in interior Alaska since 2001. Fischer (2006a) and Saperstein (2005) provide the history and rationale of the collective and Kanuti NWR-specific efforts concerning monitoring Alaska’s mid-continent white-front population. A total of 101 east-west transects were flown during these early surveys. However, several of the transect lines were often devoid of geese. Therefore, after consulting with Migratory Bird Management (Fischer 2009), KANWR focused their survey effort in 2009 on the 25 transects where geese were most likely to occur. Thereafter, these 25 transects constituted the regular annual molting goose survey on the Refuge. In addition, a complete survey that includes the original 101 transects and recapitulates the 2006–2008 surveys will be conducted at five-year intervals.

**Study Area and Methods:**

*“Official” Observations*

After a period of refinement in methods beginning in 2001, protocols for the “official” survey that once covered 101 transects were finalized by 2003. This survey was repeated consistently from 2006–2008 (Saperstein 2005, Harwood 2006, 2007, 2008). These transects covered goose habitat within KANWR, as well as Lake Todatonten and the terminus of the Kanuti River (i.e. the confluence of Kanuti and Koyukuk Rivers, upriver to Kanuti Canyon; Fig. 1). During these surveys most white-fronts were observed in three core areas: (1) the Mud Lakes and Kanuti River down to its confluence with the Kanuti Kilolitna River; (2) near Katalahosa Lake, and; (3) near South Fork Koyukuk River/Fish Creeks. The latter two areas began to be used in later

surveys while the Mud Lakes/Kanuti always hosted geese. Therefore, we selected 25 transects that covered these core areas (12, 5, and 8 transects of varying lengths each in the South Fork, Katalahosa, and Mud Lakes/Kanuti areas, respectively) to improve survey efficiency and began surveying them exclusively beginning in 2009. The reduced effort affords the Refuge greater flexibility to deal with annual plane/pilot/observer availability, budget shortfalls, variation in weather, etc.

Surveys were conducted in a Bellonca Scout on floats and methods follow those described in Harwood (2006, 2007, 2009) and Saperstein (2005). Unfortunately, logistical considerations (e.g., personnel availability) necessitated that the 2010 survey be conducted 7-14 days earlier than in previous years.

#### *“Unofficial” Observations*

Unofficial observations are those made: a) within the historical study opportunistically using methods are not repeatable between years (“incidental”), and b) outside the historical study area (“supplemental”). Unofficial observations are recorded separately from official in this report. While interannual comparisons of these data are not possible, they allow Refuge personnel to monitor changes in habitat occupancy throughout the historical and non-surveyed portions of the Refuge.

Analysis of historical goose distribution and abundance indicated regular detections along several river segments. These segments, although intersected by transects, tend to be sinuous and/or south-north trending, and not well suited to coverage by east-west transects. Therefore, we covered these areas by close, regular circling, rather than intercepting them intermittently as we flew straight transects. Three areas within the historical study area were selected for this type of “unofficial” surveying by circling: the Kanuti and South Fork Koyukuk Rivers, and Kanuti Chalatna Creek. In addition, the greater main stem Koyukuk River corridor (e.g., including its immediate oxbows and other potential goose habitat) between Old Bettles and the Kanuti River mouth was also included in this “unofficial” survey. Although it is not in the “historical” survey area, Canada Geese have been regularly observed there (Fig. 2).

In 2010, incidental goose observations were also made by Refuge staff while flying in support of an unrelated project that included collecting  $\leq 10$  white-front goslings on Kanuti Refuge.

## **Results:**

### *General Conditions*

Refuge personnel completed surveys of all official and unofficial areas during 27-29 June 2010. On 27 June, transects in the South Fork/Fish Creek transects were surveyed. Survey conditions for 27 June were as follows:

Sky = clear with occasional scattered clouds late in the day

Visibility =  $\geq 30$  miles

Wind = at 0900 calm, later in the day increasing 5-15 mph from the west

On 28 June, the Katalahosa Lake and Kanuti Flats transect areas were surveyed in the morning. In the afternoon the Lake Todatonten, and some of the unofficial riparian areas were surveyed (Kanuti River from cabin to mouth plus the main stem Koyukuk River back to Bettles) Survey conditions were as follows:

Sky = clear.

Visibility =  $\geq 30$  miles

Wind = Calm in the morning, and light, 2-12 mph, out of the west in the afternoon.

On 29 June, Kanuti Chalatna Creek and the South Fork unofficial riparian areas were completed. Survey conditions were as follows:

Sky = clear in the morning, with late afternoon thunderstorm buildups resulting in mostly overcast by evening.

Visibility =  $\geq 30$  miles

Wind = Calm in the morning, and variable 5-15 mph in the late afternoon associated with thunderstorms.

Total survey flight time (14.7 hr, \$1602) for the project included: 3.4 hr for 27 June, 6.3 hr for 28 June, and 5.0 hr for 29 June (flight hours are “survey” hours, no ferry-time included. Fuel costs for the survey (14.7 hr x 7 gal/hr x \$7.50/gal [Bettles pricing]) were \$772.

#### *“Official” Goose Observations*

Totals of 361 white-fronts (272 adults and 89 young) and 289 Canada Geese (141 adults and 148 young) were observed during official surveys. Geese were observed on 12 of 25 transects (white-fronts on 7, and Canada Geese on 5; Table 1; Fig. 1). Seventy-eight percent (212 individuals) of adult white-fronts were detected on only 2 transects (transect numbers 25 and 27), with 224 (82%) individuals in the “Mud Lakes” area; only 7 young white-fronts were detected at Mud Lakes. No geese were observed at Lake Todatonten. A multi-year comparison of “official” geese detections is provided in Table 3.

#### *“Unofficial” Goose Observations*

An additional 169 Canada Geese (76 adults and 93 young) were observed on sloughs, oxbows, and backwaters along the Koyukuk River (outside of the study area, but largely within the Refuge; Table 2; Fig. 2). However, only 12 white-fronts were observed in this area.

Opportunistic counts made while flying tight circles over the Kanuti River (upriver and downriver of Katalahosa Lake transects) and South Fork Koyukuk River (upriver of the northernmost official transects) yielded an additional 51 white-fronts (12 adults and 39 young) and 129 Canada Geese (42 adults and 87 young). No geese were observed along Kanuti Chalatna Creek. An additional 21 white-fronts in the Mud Lakes area were found during unofficial surveys but were missed during the official transect surveys. None of these observations were used in comparisons with previous years’ surveys.

#### *All Goose Observations*

Totals of 445 white-fronts (294 adults, 151 [34%] young) and 587 Canada Geese (259 adults, 328 [56%] young) were observed over the three days during both official and unofficial observations,

#### *Other Wildlife Observations*

The crew observed 76 adult and  $\geq 30$  young swans along transects, plus another 2 adults during incidental efforts. No other bird or mammal observations were recorded.

## Discussion and summary

Even though we reduced our survey effort in 2009 (25 vs. 101 transects) we recorded the highest number of adult white-fronts since the survey's inception. However, in 2010, we observed 36% fewer adult white-fronts than in the previous year. This may have resulted from any of the following reasons:

- We conducted the work earlier (up to 10 days) in 2010, and our survey may have pre-dated the arrival of additional molt migrants to the study area;
- Below-average snowpack caused very dry conditions throughout the breeding season in 2010. This may have resulted in non-breeders or failed breeders departing the study area earlier in the summer.

Unfortunately, the interpretation of data collected on this survey is confounded by our inability to clearly distinguish between “resident” (i.e., resident throughout the breeding season) and “migratory” (non-local failed breeders, etc.) birds. The observed occurrence of family groups help us identify successful local breeders to an extent, but the status (e.g., Kanuti breeder, Kanuti non-breeder, molt-migrant, etc.) of flocked birds cannot be ascertained by the survey methods currently employed. Consequently, the annual contribution of these cohorts to the goose population on the Refuge is unknown.

Despite the considerably lower number of adult white-fronts observed in 2010 compared to the previous year, the total number of geese observed on the “official” surveys is within the range observed in other years. Therefore, it appears that even though we reduced effort to increase survey efficiency, we did not compromise our ability to measure the population.

As was observed in past surveys, the Mud Lakes complex was found to be the most important local molting area for adult white-fronts in 2010. However, few young white-fronts were observed there, despite finding the second highest number of young observed on any survey to date. The northern (South Fork/Fish Creek) and middle (Katalahosa) transect areas are more variable year to year, although they always support fewer birds. No geese were observed at Lake Todatonten for the *fourth* year in a row. The Bureau of Land Management, the agency that manages the lake, is concerned that the lake may be drying up. We observed that the lake was very shallow during our survey. Unless this drying trend reverses, Lake Todatonten may cease to be used by waterfowl in the future, including molting geese.

The original intent of the survey was primarily to monitor white-front distribution and abundance. The “official” survey (i.e., the transect areas, Lake Todatonten, Kanuti River mouth) does a good job at this, with >90% of all adult white-fronts (93% and 95%, in 2010 and 2009, respectively) being detected in the areas covered by these transects. However, only about half (54%) of Canada Geese adults were detected along transects in the “official” survey in 2010. Therefore, supplementing this survey with “unofficial” survey work, particularly along the main stem Koyukuk River, is an important tool to better track molting and breeding Canada Geese on the refuge.

## **Literature Cited:**

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Table 1. Official<sup>1</sup> goose observations by transect during aerial goose surveys, Kanuti NWR, Alaska, June 27–29, 2010. [GWFG = Greater White-fronted Goose, CAGO = Canada Goose.]

Transect	Species	Number <sup>2</sup>	
		Adults	Young
25 <sup>3</sup>	<b>GWFG</b>	<b>134</b>	<b>7</b>
	CAGO	6	14
27 <sup>3</sup>	<b>GWFG</b>	<b>78</b>	<b>0</b>
29 <sup>3</sup>	<b>GWFG</b>	<b>4</b>	<b>12</b>
36 <sup>3</sup>	<b>GWFG</b>	<b>15</b>	<b>0</b>
51 <sup>4</sup>	<b>GWFG</b>	<b>5</b>	<b>3</b>
	CAGO	32	4
52 <sup>4</sup>	CAGO	46	48
91 <sup>5</sup>	<b>GWFG</b>	<b>2</b>	<b>9</b>
93 <sup>5</sup>	CAGO	45	65
95 <sup>5</sup>	<b>GWFG</b>	<b>26</b>	<b>43</b>
96 <sup>5</sup>	CAGO	2	4
97 <sup>5</sup>	CAGO	4	3
Kanuti R. terminus	<b>GWFG</b>	<b>8</b>	<b>15</b>
	CAGO	6	11
Total	<b>GWFG</b>	<b>272</b>	<b>89</b>
	CAGO	141	149

<sup>1</sup> Geese observed on transects, at Lake Todatonten, or at terminus of Kanuti River.

<sup>2</sup> Geese in different groups on transect were combined.

<sup>3</sup> Transects in Mud Lakes/Kanuti River area.

<sup>4</sup> Transects in Katalahosa Lake area.

<sup>5</sup> Transects in South Fork Koyukuk River/Fish Creek area.

Table 2. Unofficial<sup>1</sup> goose observations during aerial molting survey, Kanuti NWR, Alaska, June 27–29, 2010. [**GWFG** = Greater White-fronted Goose, **CAGO** = Canada Goose.]

<b>River Segment</b>	<b>Species</b>	<b>Number</b>	
		<b>Adults</b>	<b>Young</b>
Koyukuk River <sup>2</sup>	<b>CAGO</b>	10	20
Koyukuk River <sup>2</sup>	<b>CAGO</b>	6	14
Koyukuk River <sup>2</sup>	<b>CAGO</b>	4	8
Koyukuk River <sup>2</sup>	<b>CAGO</b>	22	17
Koyukuk River <sup>2</sup>	<b>GWFG</b>	<b>4</b>	<b>8</b>
	<b>CAGO</b>	12	18
Koyukuk River <sup>2</sup>	<b>CAGO</b>	22	16
South Fork Koyukuk <sup>2</sup>	<b>CAGO</b>	10	10
Kanuti River <sup>2</sup>	<b>CAGO</b>	3	13
<b>Subtotal</b> <sup>2</sup>	<b>GWFG</b>	<b>4</b>	<b>8</b>
	<b>CAGO</b>	89	116
Kanuti River <sup>3</sup>	<b>CAGO</b>	6	18
Kanuti River <sup>3</sup>	<b>CAGO</b>	15	25
Kanuti River <sup>3</sup>	<b>CAGO</b>	8	21
Kanuti River <sup>3</sup>	<b>GWFG</b>	<b>4</b>	<b>20</b>
Kanuti River <sup>3</sup>	<b>GWFG</b>	<b>2</b>	<b>4</b>
Kanuti River <sup>3</sup>	<b>GWFG</b>	<b>6</b>	<b>15</b>
<b>Subtotal</b> <sup>3</sup>	<b>GWFG</b>	<b>12</b>	<b>39</b>
	<b>CAGO</b>	29	64
Mud Lakes <sup>4</sup>	<b>GWFG</b>	<b>6</b>	<b>15</b>
<b>Grand <u>Unofficial</u> Subtotal</b> <sup>1</sup>	<b>GWFG</b>	<b>22</b>	<b>62</b>
	<b>CAGO</b>	118	180
<b>Combined Official/Unofficial Total</b> <sup>5</sup>	<b>GWFG</b>	<b>294</b>	<b>151</b>
	<b>CAGO</b>	259	329

<sup>1</sup> Observations made outside “official” study area or during incidental efforts within official survey area

<sup>2</sup> Geese were outside official study area

<sup>3</sup> Geese observed along rivers surveyed by circling, rather than transect method

<sup>4</sup> Geese observed during gosling sampling activities

<sup>5</sup> Includes both official and unofficial observations

Table 3. Goose and swan observations<sup>1</sup> by year during aerial goose surveys, Kanuti NWR, Alaska, 2001–2003, 2006–2010. [GWFG = Greater White-fronted Goose, CAGO = Canada Goose; ad = adults, yg = young]

<b>Year</b>	<b>GWFG ad</b>	<b>GWFG yg</b>	<b>CAGO ad</b>	<b>CAGO yg</b>	<b>Swan ad</b>	<b>Swan yg</b>
2001	332	142	67	54	91	6
2002	117	50	101	128	103	14
2003	313	65	52	78	108	13
2006	332	71	108	95	219 <sup>2</sup>	37 <sup>2</sup>
2007	280	100	124	190	189 <sup>2</sup>	70 <sup>2</sup>
2008	308	0	116	163	211 <sup>2</sup>	57 <sup>2</sup>
2009 <sup>3</sup>	425	123	134	179	73 <sup>2</sup>	31 <sup>2</sup>
2010 <sup>3</sup>	272	89	141	149	78 <sup>2</sup>	32 <sup>2</sup>

<sup>1</sup> Does not include observations made outside “official” study area or during incidental efforts

<sup>2</sup> represents minimum counts

<sup>3</sup> represents reduced effort



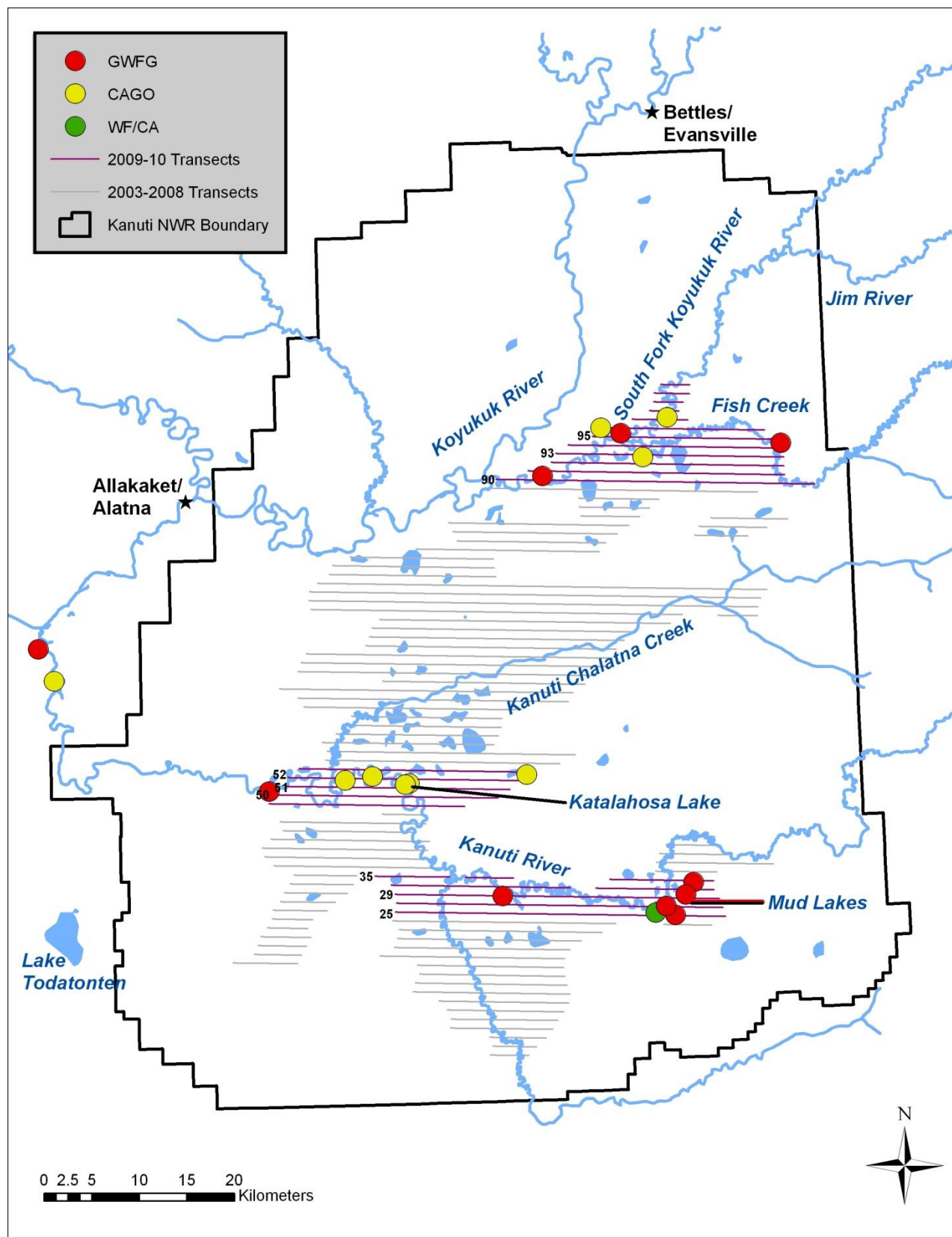


Figure 1. Locations of reduced effort aerial transect lines and “official” goose observations, 27–28 June, 2010, Kanuti NWR. [GWFG = Greater White-fronted Geese, CAGO = Canada Geese; WF/CA = both geese species co-located; black numbers indicate transect number]

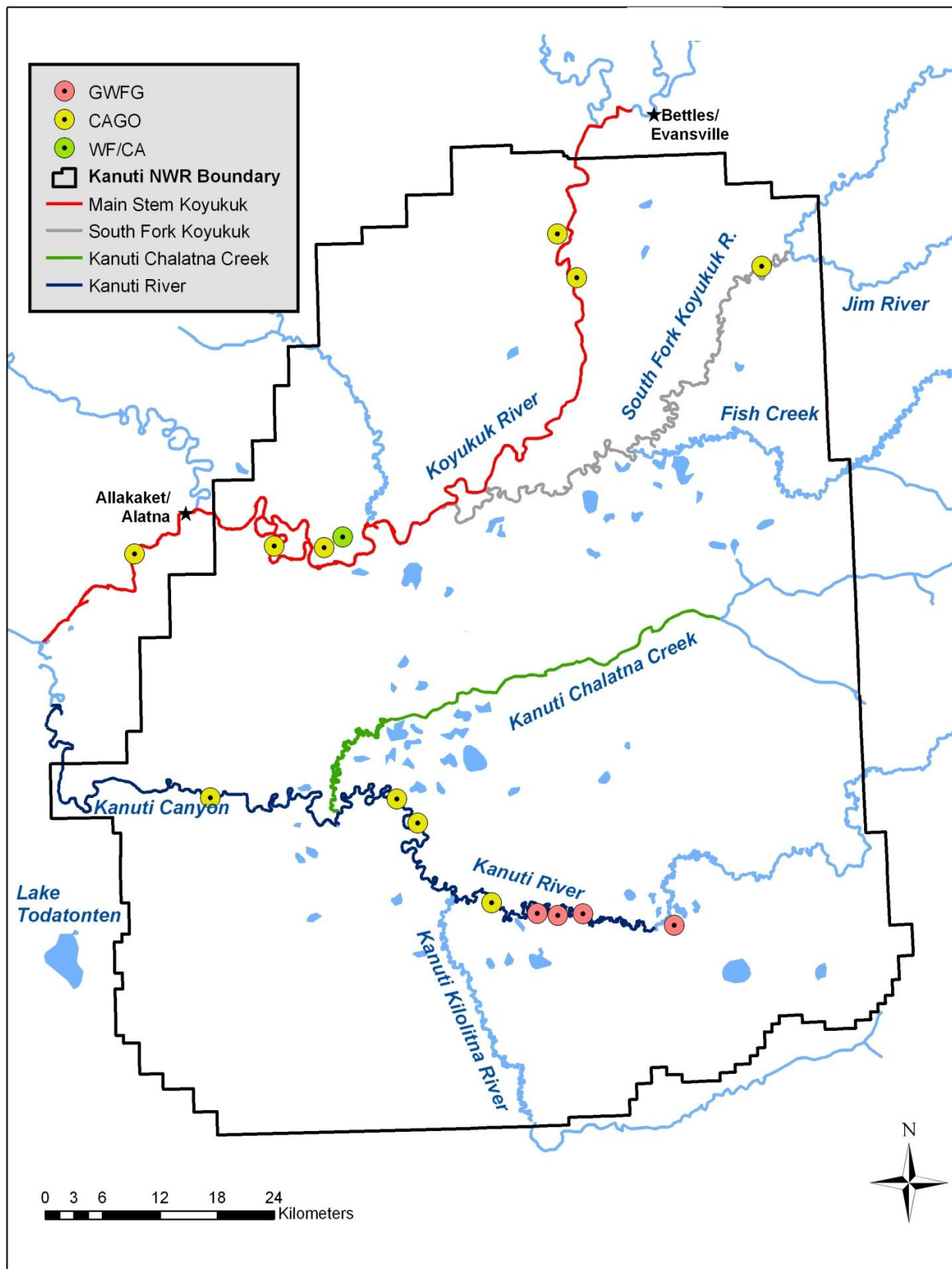


Figure 2. Locations of supplemental river surveys and “unofficial” goose observations, 28–29 June, 2010, Kanuti NWR. [GWFG = Greater White-fronted Geese, CAGO = Canada Geese; WF/CA = both geese species co-located]

**Attachment: Memo from Julian Fischer (*filename = Kanuti surveys.doc*) in 2 April 2009 to Christopher Harwood (carbon copied to Lisa Saperstein and Mike Spindler)**

Thoughts on Kanuti NWR white-fronted goose survey efforts. Julian Fischer 4/2/2009

Differing Missions and Scales

I believe MBM and Refuges monitor bird population on different scales, and this influences what we promote as priority activities for each of our respective programs. For MBM, we focus on broad-scale, population level surveys that can be used for management indices and ultimately harvest regulations. Wherever possible, surveys are multi-species. Species-specific surveys are typically conducted only when significant population level conservation concerns are apparent. Refuges, on the other hand, have local constituents and defined boundaries in which to focus their efforts. For that reason, a conservation concern for a single species may be a very important issue within the boundaries of a given refuge even if the net impact to the continental population may be insignificant.

These two different scales on interest came together in the late 1990s as a result of Mike Spindler's insights and concern for what appeared to be a localized decline of white-fronted geese. Due to his energy and leadership, studies were initiated that identified differences in migration timing, routes, and winter distribution. This provided the needed information to institute changes in site-specific hunting regulations, and a more conservative approach to harvest management in the updated Flyway Management Plan. It is always difficult to determine a cause and effect response, but it is heartening to note that the indices that were used to identify a regional decline have since returned to levels observed in the early 1990s.

Breeding Population Surveys

Continentially there has been a movement among goose managers to move away from winter surveys and towards breeding pair surveys to provide data for management. A few years ago, I was hopeful that the Alaska boreal midcontinent population could be monitored through a multi-refuge coordinated breeding pair survey. Perhaps this was naïve. Mike had already described the difficulty in detecting white-fronts in the boreal forest, especially when nesting is initiated. Nonetheless, we (MBM, Selawik, Koyukuk, and Kanuti) all tried it. I believe we were successful in Selawik, but less so at Koyukuk and Kanuti.

The reason it worked well at Selawik, I believe, is threefold: the habitat is taiga rather than boreal forest which allows for far better visibility; the Selawik population is at the terminus of the subpopulation migration route; and the refuge headquarters is located next to the breeding site allowing for relatively inexpensive scouting flights to determine appropriate timing. It is possible that breeding pair surveys could be improved for Koyukuk and Kanuti, but precise and accurate estimates would likely require a significant increased cost in time and funding and a yet undiscovered method to account for detection probability and overflight of birds towards more northerly breeding areas. Managers should consider several facts before pursuing such efforts further: 1) on a continental scale, the midcontinent white-front population is rebounding following more restrictive harvest measures as detailed in the Flyway Management Plan, and in changes to the AMBCC harvest regulations in staging areas (closure of harvest under subsistence regulations in Delta Junction); 2) regionally, molting survey data suggests numbers have returned to early 1990 levels in Koyukuk-Nowitna NWR; 3) annual survival estimates in the interior component of the midcontinent population has increased over the last few years; 4) annual surveys conducted by MBM (continental BPS- N754) provide estimates of white-fronts in all interior refuges (albeit with low precision); and 5) periodic "Expanded Breeding Pair Surveys" conducted by MBM provide estimates of population size and distribution with greater precision than the annual survey. For these reasons, it is difficult for MBM to promote a species-specific breeding pair survey for white-fronts within the interior refuges as a high priority task.

As for the molting survey at Kanuti, significant changes in design and implementation are warranted, but the survey should continue as one element of the refuge monitoring effort. Past surveys have demonstrated that the population of molting white fronts is small (a few hundred birds), and traditionally many of those birds were at Todatonten, outside refuge boundaries. While the area doesn't appear to be important on a population level, it may be important locally, both to subsistence hunters, and as a component of the refuge ecology (*Spring/summer subsistence harvest of white-fronts in the Kanuti area has been reported to be around 75 birds annually. (This suggests that there is a local reliance on these birds and depending on when the harvest occurs, could be a limiting factor for the species in the refuge. Unfortunately, the AMBCC survey does not distinguish between spring and summer harvest. If the harvest is taking place in spring, then most geese harvested are likely passing through to breeding sites further north. If the harvest is occurring in summer, then they are likely local breeders/molters, and the impact the reported harvest on a small population will certainly keep the population very low).* Thus it seems prudent for the refuge to remain aware of any significant shifts in the numbers of molters on the refuge. That said, it is clear that significant efficiencies can be achieved in the design of the survey. Given the numbers of birds and the well established distribution, I believe the survey could be completed in a single day effort. I presume that the refuge possesses all the point locations, or at least transect numbers associated with molt surveys since 2000. If the survey area was pared down to include 80% of historical observations, then total flight time would be significantly reduced. There would be a slight loss of comparability to previous year's survey results but it would be a reasonable sacrifice. I would then advocate an effort to fly the full complement of transects that contained 100% of historical observations once every five years. I suspect that by mapping out 100% of molting goose locations you would find room for significant efficiencies as well. Results of the expanded molting goose survey on a 5-year interval will provide information about the proportion of geese that occur outside of the core surveyed area, and will reveal changes in distribution.

### Distribution

Despite the difficulties associated with population surveys, important localized information on habitat use can be obtained from aerial surveys. Such information, I believe, may be important for land managers (i.e. Refuge Managers) as they grapple with various issues that may impact their refuges. Distribution of white-fronts at all phases of their life cycle is important to understand, regardless of their ultimate breeding site. Without intact and productive staging habitats, white-fronts will be hard pressed to breed and raise young successfully. ANILCA specifies that Kanuti is to conserve greater white-fronted goose populations and habitats, and as far as I know this is not limited to local breeders; rather it would include all white-fronts that use the refuge even for a stopover period. A number of years of May survey data from various sources (refuge, MBM) should provide a relatively clear picture of where your hot spots are. From reading your reports it seems that the most notable locations are the Mud Lakes region, the confluence of the South Fork Koyukuk and Fish Creek, and the confluence of the Chalatna Creek and Kanuti River. I suspect the same locations are important during the molting period, but you should examine those data to confirm that assumption. Replication of full molting surveys on a 5-year schedule, as described earlier, will help reveal significant changes in distribution.

The situation at Todatonten Lake that you describe is a compelling problem. I am not sure if BLM is aware of the former significance of the area and the apparent change in distribution of geese away from the lake. Perhaps further investigations can be made under the umbrella of climate change studies.

### Production

The status of migratory birds can be monitored in various ways. In an ideal world we would have estimates of breeding population size, annual productivity, annual survival, and harvest estimates for each and every species that occurs on the refuge. Although breeding population size

is very difficult to monitor annually for this species in the boreal forest, productivity is a measure that can be monitored. The molting survey is one method of estimating production, but as noted in the report, weather conditions can affect detection of broods from an aerial platform, and detection of non or failed-breeders is likely far higher than for successful breeders – a situation that can lead to biased estimates of production. An alternative method is to monitor production through a float survey along the Kanuti River. The method was written up in a Kanuti NWR report by Merry Maxwell in 2001, and appears to be a relatively efficient way to calculate production. According to the report the effort required 2 people for 2 full days. While the total numbers of adult birds are likely to be fewer than seen by air, a more accurate assessment of production is likely result. It sounds like these float data go back to the mid 1990s, and were stopped in 2000. There may be logistical reasons that the survey was dropped, but if not, the refuge should consider this as a method to calculate production. This effort would complement the 13 year data set of comparable efforts on the Koyukuk/Nowitna refuge. MBM is currently attempting to devise a method to estimate interior region production through age ratio work at the fall staging area in Delta Junction. I recently encouraged a graduate student to take this project on, and he'll be starting UAA next year. It would be useful to have refuge specific production estimates to compare with interior region estimates.

### Summary

The refuge should not proceed with additional spring breeding pair surveys of white-fronted geese, but should visit key stopover locations when standard flights spring phenology flights are conducted; molt surveys should continue annually but with a significantly reduced area coupled with a survey at the current design once every 5 years; and renewal of float surveys should be considered as a method to monitor productivity. Please feel free to give a call if you want to talk about any of this further.